

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) A wheel comprising: a disc portion; and a rim portion substantially contiguous with said disc portion wherein said wheel is of substantially unitary steel construction, said wheel further comprising inner and outer bead-seat portions, said inner and outer bead-seat portions being substantially contiguous with said rim portion;

said rim portion having an inner flange portion which is substantially contiguous with said rim portion and an outer flange portion which is substantially contiguous with said rim portion, said inner flange and said outer flange an inner edge of said rim portion and an outer edge of said rim portion;

said rim portion having a 5° or 15° taper drop center well;

said inner bead seat portion being adjacent to an inner edge of said rim portion and said ~~seuter~~ outer bead seat portion being located adjacent an outer edge of said rim portion; and

wherein said disc portion is joined to said rim portion between said inner edge and said outer edge.

2. (~~Presently~~Currently Cancelled) ~~The wheel of claim 1, further comprising a flange portion which is substantially contiguous with said rim portion.~~

3. (~~Presently~~Currently Cancelled) ~~The wheel of claim 1, further comprising a well portion, which is substantially contiguous with said rim portion.~~
4. (Previously Cancelled) ~~The wheel of claim 1, further comprising a bead seat portion, which is substantially contiguous with, said rim portion.~~
5. (Previously Amended) The wheel of claim 1, wherein said bead-seat has about a 5° or 15° taper.
6. (~~Presently~~Currently Cancelled) ~~The wheel of claim 5, wherein said wheel has a 5° or 15° drop center rim.~~
7. (Currently Cancelled) ~~The wheel of claim 1, further comprising an inner and outer flange portions and an outer rim portion, wherein said inner and outer flange portions are substantially contiguous with said rim portion.~~
8. (Currently Cancelled) ~~The wheel of claim 1, further comprising an inner flange portion and an outer flange portion, wherein said inner and outer flange portions are substantially contiguous with said rim portion and are positioned approximately at opposing ends of said rim portion adjacent said inner edge and said outer edge respectively; a well portion substantially contiguous with said rim portion; an inner bead seat portion substantially contiguous with said rim portion; and an outer bead seat portion substantially contiguous with said rim portion, wherein said inner bead seat portion is approximately positioned between said inner flange portion and said well~~

~~portion, and wherein said outer bead seat portion is approximately positioned between said outer flange portion and said well portion.~~

9. (Original) The steel wheel of claim 1, wherein said disc portion has a center opening therethrough.

10. (Original) The wheel of claim 1, wherein said disc portion has at least one mounting opening the therethrough.

11. (Original) The wheel of claim 1, wherein said disc portion has at least one vent opening therethrough.

12. (Original) The wheel of claim 1, wherein said disc portion has at least one valve opening therethrough.

13. (Original) The wheel of claim 1, substantially mounted to a vehicle.

14. (Original) The wheel of claim 1, further comprising a tire substantially mounted to said wheel.

15. (Currently Amended) A method of manufacturing a wheel comprising the steps of:

forming a disc portion from steel stock of substantially uniform thickness with a spinning machine;

forming a rim portion with a spinning machine wherein said rim portion is substantially contiguous with said disc portion and wherein said wheel is of substantially unitary steel construction, said rim portion further having an inner edge and an outer edge;

forming an inner flange portion and an outer flange portion, wherein said flange portions are substantially contiguous with said rim portion, said inner flange portion being adjacent the inner edge of said rim portion and said outer flange portion being adjacent the outer edge of said rim portion;

forming a drop center well having a taper of between about 5 and 15 degree taper; and

forming inner and outer bead-seat portions, wherein said bead-seat portions are substantially contiguous with said rim portion and wherein said inner bead seat portion is adjacent said inner edge and wherein said outer bead-seat portion is adjacent said outer edge; and

wherein said spin-formed disc portion is contiguous with said rim portion between said inner edge and said outer edge.

16. (Presently ~~Currently~~ Cancelled) ~~The method of claim 15, wherein said wheel is formed from steel stock of substantially uniform thickness.~~

17. (Presently Cancelled) ~~The method of claim 15, further comprising the step of forming a flange portion, wherein said flange portion is substantially contiguous with said rim portion.~~

18. (Presently Cancelled) ~~The method of claim 15, further comprising the step of forming a well portion, wherein said well portion is substantially contiguous with said rim portion.~~

19. (~~Presently~~Currently Cancelled) ~~The method of claim 15, further comprising the step of forming an inner flange portion and an outer flange portion, wherein said flange portions are substantially contiguous with said rim portion.~~

20. (Previously Cancelled) ~~The method of claim 15, further comprising the step of forming a bead-seat portion, wherein said bead-seat portion is substantially contiguous with said rim portion.~~

21. (Previously Amended) The method of claim 15, wherein said bead-seat is formed with about a 5° or 15° taper.

22. (~~Presently~~Currently Cancelled) ~~The method of claim 21, wherein said wheel is formed with a drop-center rim.~~

23. (Original) The method of claim 15, further comprising the step of forming a center opening in said disc portion.

24. (Original) The method of claim 15, further comprising the step of forming at least one mounting opening in said disc portion.

25. (Original) The method of claim 15, further comprising the step of forming at least one vent opening in said disc portion.

26. (Original) The method of claim 15, further comprising the step of forming at least one valve opening in said disc portion.

27. (Previously Cancelled) ~~The method of claim 15, wherein said forming steps comprise at least one of spinning and/or flow forming processes.~~

28. (Previously Cancelled) ~~The method of claim 15, wherein said method utilizes a spinning machine.~~

29. (Original) A wheel of unitary steel construction produced in accordance with the method of claim 15.

30. (Currently Amended) A method of manufacturing a one-piece wheel of 5° and 15° drop center rim of the type having a well, inner and outer bead seats and flanges wherein the said method comprises the following steps:

a. Providing a generally circular steel blank having a pre-determined uniform thickness and a center hole pierced to a predetermined size;

b. performing the blank in a CNC spinning machine to a predetermined cylindrical shape and size by spinning and flow forming the blank, the blank being positioned and clamped between an inner mandrel and a clamping plate, the predetermined shape having a substantially cylindrical rim portion and a substantially planar disc portion, such inner mandrel having a outboard surface which conforms to a predetermined inner diameter of the rim;

c. further spinning in a CNC spinning machine the spun and flow formed preform to reduce thickness and consequently to increase the width to a predetermined size while maintaining the predetermined inner diameter;

d. further spinning the preform on the peripheral portion of the cylinder to displace the material to form an inner flange having a predetermined shape and size; and

e. further spinning the preform in a CNC spinning machine to impart final shape and profile to the rim portion comprising of well having a drop center of between about 5° and 15° taper, inner and outer bead seats and inner and outer flanges using such inner mandrel, the central line axis of which is offset against the centerline of the central hole of the preform during spinning operation;

wherein said inner bead seat and said inner flange are adjacent an inner rim edge and said outer bead seat and said outer flange are adjacent an outer rim edge, and wherein said disc portion is contiguous with said rim portion between said inner rim edge and said outer rim edge.

31. (Previously Amended) The method as claimed in claim 30 wherein spin forming the peripheral of the blank by engaging the blank with a forming roller so as to obtain controlled thickness reduction and shape in the peripheral and inner portion of the blank.

32. (Previously Amended) The method as claimed in claim 30 further comprising the step of spinning a peripheral cylindrical portion of the preform against an outboard surface of an outwardly positioned with respect to the axis of revolution of the blank outer roll to form a predetermined cylindrical portion of the inner flange.

33. (~~Presently~~Currently Amended) The method as claimed in claim 30 wherein spin forming a portion of the blank peripheral portion is performed by engaging the blank with a forming roller to form the final shape of the well.

34. (~~Presently~~Currently Amended) The method as claimed in claim 30 wherein spin forming a portion of the blank peripheral portion is performed by engaging the blank with a forming roller to form the final shape of the bead seat.

35. (~~Presently~~Currently Amended) The method as claimed in claim 30 wherein spin forming the bead seat portion of the preform blank is performed by engaging the blank with a forming roller against the outboard surface of the outer mandrel to form the final shape of outer flange.

36. (Previously Amended) The method as claimed in claim 30, wherein the step of spinning and flow forming the blank comprises a plurality of passes of the forming roller.

37. (Previously Amended) The method as claimed in claim 30 wherein after completion of the spinning operation bolt holes are pierced in said one piece wheel using a press.

38. (Previously Amended) The method as claimed in claim 30 wherein after completion of the spinning operation, a plurality of bolt holes and a plurality of vent holes are pierced in said one piece wheel using a press.

39. (~~Currently~~ Previously Amended) The method as claimed in claim 30 wherein after piercing the center, bolt holes and vent holes, the center hole and the mounting holes are machined to required size.

40. (Previously Amended) The method as claimed in claim 30 wherein after machining the center hole and the mounting holes to a required size, the inner and outer flange crown edges are machined to provide a radius or a flat.

41. (Original) The method as claimed in claim 30 wherein said step (a) consists the step of providing a disc blank of substantially uniform thickness of low carbon steel or HSLA steel composition.

42. (Previously Cancelled) ~~The method as claimed in claim 30 wherein a butt welded hoop of predetermined diameter, width and thickness can also be used instead of a blank.~~

43. (Previously Cancelled) ~~The method as claimed in 39 wherein the butt welded hoop of predetermined diameter, width and thickness can also be used to manufacture the rim part alone.~~

44. (Previously Cancelled) ~~The method as claimed in 39 wherein the butt welded hoop of predetermined diameter, width and thickness can also be used to manufacture of the rim part alone.~~

45. (Currently Amended) Apparatus for manufacturing a one-piece wheel of 5° and 15° drop

center rim of the type having an integral disc and rim portion well, inner & outer & inner bead-seat and fixed flanges, wherein the said method comprises

means for providing a generally circular blank,

means for forming the blank to a pre-determined uniform thickness, the blank having a center disc portion and a center hole pierced to a predetermined size,

means for spinning the blank to form a preform having a center disc portion and an outer rim portion, the means comprising a mandrel and clamping plate, such mandrel having a outboard surface which conforms to the shape of well having a drop center of between about 5° and 15° taper, inner and outer bead seat and fixed flanges, wherein the blank peripheral and inner portions are spun and flow formed against the outboard surface of the inner mandrel and shaping rolls to form the final shapes of the rim, and wherein said disc portion is contiguous with said rim portion between said inner bead seat and said outer bead seat.

46. (Previously Amended) An apparatus for manufacturing a one-piece wheel of 5° and 15° drop center rim for a vehicle having an integral disc and rim portion comprising of well, bead seats and flanges manufactured by the process claimed in claim 30.

47. (Previously Cancelled) ~~A one piece wheel of 5° and 15° drop center rim for a vehicle having an integral disc and rim portion as claimed in claim 30 comprising of well, bead seat and flanges wherein when spin forming machine is programmed to form different shapes.~~

48. (Previously Cancelled) ~~A method of manufacturing a one piece wheel of 5° and 15° drop~~

~~center rim for a vehicle having an integral disc and rim portion as claimed in claim 30 comprising of well, bead seat and flanges as described in the description of complete specification and as illustrated by way of drawings accompanying the complete specification.~~

49. (Previously Cancelled) ~~A one piece wheel of 5° and 15° drop center rim for a vehicle having an integral disc and rim portion as claimed in claim 1 comprising of well, inner and outer bead seats and inner and outer flanges as described in the description of complete specification and as illustrated by way of drawings accompanying the complete specification.~~

50. (Previously Cancelled) ~~A one piece wheel of 5° and 15° drop center rim for a family of vehicle wheels having any plurality of axial width, diameter and offset having an integral disc and rim portion as claimed in claim 30 comprising of well, inner and outer bead seats and inner and outer flanges as described in the description of complete specification and as illustrated by way of drawings accompanying the complete specification, may be produced from the blanks.~~

51. (Currently Amended) An apparatus for manufacturing from a steel blank a steel wheel of substantially unitary construction comprising a disc portion and a rim portion, said apparatus comprising:

a. a frame;

b. a rotating component which is substantially rotatably affixed to said frame and which rotates said blank;

c. a clamping component which maintains said steel blank in a substantially fixed position relative to said rotating component; and

d. a forming component, wherein said forming component substantially forms said disc and rim portions into said steel wheel of unitary construction from said steel blank, said wheel comprising an inner and an outer bead seat and a well having a drop center of between about 5° and 15° taper formed on said rim portion, and wherein said disc portion is substantially contiguous with said rim portion between said inner bead seat and said outer bead seat.

52. (~~Presently~~Currently Cancelled) ~~The apparatus of claim 51, wherein, said forming component forms a well into said rim portion of said unitary wheel.~~

53. (Previously Cancelled) ~~The apparatus of claim 51, wherein, said forming component forms one or more bead seats into said rim portion of said unitary wheel.~~

54. (Previously Cancelled) ~~The apparatus of claim 51, wherein, said forming component forms an inner bead seat and an outer bead seat into said rim portion of said unitary wheel.~~

55. (Previously Amended) The apparatus of claim 51, wherein said inner and outer bead seats have approximately a 5° or 15° angle.

56. (Original) The apparatus of claim 51, wherein, said forming component forms one or more flanges into said rim portion of said unitary wheel.

57. (Original) The apparatus of claim 51, wherein, said forming component forms inner and outer flanges into said rim portion of said unitary wheel.

58. (Currently AmendedCancelled) ~~The apparatus of claim 51, wherein, said forming component forms a unitary wheel having approximately a 5° or 15° drop center rim.~~